N2225 and N2226 SAS/SATA HBAs for System x

IBM Redbooks Product Guide

The N2225 and N2226 SAS/SATA HBAs for System x® are low-cost, high-performance host bus adapters for high-performance connectivity between System x servers and external storage enclosures (JBODs), tapes, and RAID storage systems. The N2225 provides two x4 external mini-SAS HD connectors with eight lanes of 12 Gbps SAS. The N2226 provides four x4 external mini-SAS HD connectors with 16 lanes of 12 Gbps SAS.

Figure 1 shows the N2225 and N2226 SAS/SATA HBAs for System x.

Figure 1. N2225 (left) and N2226 (right) SAS/SATA HBAs for System x

Did you know?

The N2225 and N2226 SAS/SATA HBAs provide high performance for storage connectivity for servers by integrating the latest enhancements in PCI Express and SAS technology, offering eight lanes (N2225) or 16 lanes (N2226) of 12 Gbps SAS matched with eight lanes of PCIe 3.0 to eliminate performance bottlenecks and provide high data transfer rates for medium-to-large capacity server storage applications.

The N2225 and N2226 SAS/SATA HBAs support SAS data transfer rates of 3, 6, and 12 Gbps per lane and SATA transfer rates of 3 and 6 Gbps per lane, and they enable maximum connectivity and performance in a low-profile (N2225) or full-height (N2226) form factor.

Rigorous testing of the N2225 and N2226 SAS/SATA HBAs by Lenovo through the ServerProven® program ensures a high degree of confidence in storage subsystem compatibility and reliability. Providing an additional peace of mind, these controllers are covered under Lenovo warranty.

Part number information

Table 1 provides the ordering part numbers and feature codes.

Table 1. Ordering part numbers and feature codes

Description	Part number	Feature code
N2225 SAS/SATA HBA for System x	00AE912	A5M0
N2226 SAS/SATA HBA for System x	00AE916	A5M1

The N2225 option part number includes the following items:

- One N2225 or N2226 adapter with a full-height (3U) bracket attached
- One low-profile (2U) bracket (N2225 only)
- Warranty Flyer
- Documentation CD
- Important Notices Flyer

Features and specifications

The N2225 and N2226 SAS/SATA HBAs have the following features and specifications:

- LSI SAS3008 12 Gbps I/O controller
- PCIe low profile (N2225) or full height (N2226), half-length form factor
- PCI Express 3.0 x8 host interface
- Eight (N2225) or 16 (N2226) external 12 Gbps SAS/SATA ports
- Supports 12, 6, and 3 Gbps SAS and 6 and 3 Gbps SATA data transfer rates
- Up to 12 Gbps throughput per port
- Two (N2225) or four (N2226) external x4 mini-SAS HD connectors (SFF-8644)
- Non-RAID SAS HBAs that support connectivity to the external storage systems, tapes, and JBOD expansion units
- High-performance IOPS LSI Fusion-MPT architecture
- Advanced power management support
- Support for SSP, SMP, STP, and SATA protocols
- Support for narrow and wide ports
- End-to-End CRC with Advanced Error Reporting
- T-10 Protection Model for early detection of and recovery from data corruption
- Spread Spectrum Clocking for EMI reductions

Supported servers

Table 2 lists the compatibility information for the N2225 and N2226 HBAs and System x, iDataPlex®, and NeXtScale servers.

Table 2. System x, iDataPlex, and NeXtScale compatibility (Part 1)

Part number	Description	x3100 M5 (5457)	x3250 M5 (5458)	x3550 M5 (5463)	x3650 M5 (5462)	nx360 M5 (5465)
00AE912	N2225 SAS/SATA HBA for System x	N	N	Y	Y	N
00AE916	N2226 SAS/SATA HBA for System x	N	N	Y	Y	N

Table 2. System x, iDataPlex, and NeXtScale compatibility (Part 2)

Part number	Description	x3500 M4 (7383, E5-2600 v2)	x3530 M4 (7160, E5-2400 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3650 M4 HD (5460)	x3750 M4 (8752)	x3850 X6/x3950 X6 (3837)	dx360 M4 (7912, E5-2600 v2)	nx360 M4 (5455)
00AE912	N2225 SAS/SATA HBA for System x	Y	N	Y	N	Y	N	Y	N	Y	N	Y
00AE916	N2226 SAS/SATA HBA for System x	Y	N	N	Y	Y	Y	Y	N	N	N	Y

Table 2. System x, iDataPlex, and NeXtScale compatibility (Part 3)

Part number	Description	x3100 M4 (2582)	x3250 M4 (2583)	x3300 M4 (7382)	x3500 M4 (7383, E5-2600)	x3530 M4 (7160, E5-2400)	x3550 M4 (7914, E5-2600)	x3630 M4 (7158, E5-2400)	x3650 M4 (7915, E5-2600)	x3690 X5 (7147)	x3750 M4 (8722)	x3850 X5/x3950 X5 (7143)	dx360 M4 (7912, E5-2600)
00AE912	N2225 SAS/SATA HBA for System x	N	N	N	N	N	N	N	N	N	N	N	N
00AE916	N2226 SAS/SATA HBA for System x	N	N	N	N	N	N	N	N	N	N	N	N

For more information about the System x servers that support each adapter, see the ServerProven website:
http://ibm.com/servers/eserver/serverproven/compat/us/

Supported storage expansion units

The N2225 and N2226 SAS/SATA HBAs support non-RAID connectivity to the external storage expansion units that are listed in Table 3. Table 3 also lists cables that can be used to attach storage expansion units to the N2225 and N2226 adapters.

Table 3. External expansion units

Machine type and model	Description
Storage expansion units (mini-SAS host interfaces)	
610012X	EXP2512 Storage Enclosure
610024X	EXP2524 Storage Enclosure
SAS cables (mini-SAS HD to mini-SAS)	
00MJ162	0.6m SAS Cable (mSAS HD to mSAS)
00MJ163	1.5m SAS Cable (mSAS HD to mSAS)
00MJ166	3m SAS Cable (mSAS HD to mSAS)

Table 4 lists drives that are supported by EXP2512 external expansion enclosures.

Table 4. Drive options for EXP2512 external expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
3.5" NL SAS HS HDDs		
00NC555	2TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
00NC557	3TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
00NC559	4TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12

Table 5 lists hard disk drives that are supported by EXP2524 external expansion enclosures.

Table 5. Drive options for EXP2524 external expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
2.5" NL SAS HS HDDs		
00NC571	1TB 7,200 rpm 6Gb SAS NL 2.5" HDD	24
2.5" SAS HS HDDs		
00NC561	146GB 15,000 rpm 6Gb SAS 2.5" HDD	24
00NC563	300GB 15,000 rpm 6Gb SAS 2.5" HDD	24
00NC565	600GB 10,000 rpm 6Gb SAS 2.5" HDD	24
00NC567	900GB 10,000 rpm 6Gb SAS 2.5" HDD	24
00NC569	1.2TB 10,000 rpm 6Gb SAS 2.5" HDD	24
2.5" SAS HS SSDs		
00NC573	200GB 6Gb SAS 2.5" SSD	24
00NC575	400GB 6Gb SAS 2.5" SSD	24

Supported operating systems

The N2225 and N2226 SAS/SATA HBAs support the following operating systems:

- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2012
- Red Hat Enterprise Linux 6 Server Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- SUSE Linux Enterprise Server 11 for AMD64/EM64T
- SUSE Linux Enterprise Server 11 for x86
- SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T
- VMware vSphere 5.1 (ESXi)
- VMware vSphere 5.5 (ESXi)

For more information about the specific versions and service levels that are supported and any other prerequisites, see the ServerProven website:
http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/nos/matrix.shtml

Warranty

The N2225 and N2226 SAS/SATA HBAs carry a one-year limited warranty. When installed in a supported System x server, the adapters assume your system's base warranty and any Lenovo warranty upgrade.

Physical specifications

The N2225 SAS/SATA HBA has the following physical specifications.

Dimensions and weight (approximate):

- Height: 69 mm (2.7 in.)
- Width: 17 mm (0.7 in.)
- Depth: 170 mm (6.7 in.)
- Weight: 100 g (0.2 lb)

Shipping dimensions and weight (approximate):

- Height: 51 mm (2.0 in.)
- Width: 143 mm (5.6 in.)
- Depth: 238 mm (9.4 in.)
- Weight: 205 g (0.45 lb)

The N2226 SAS/SATA HBA has the following physical specifications.

Dimensions and weight (approximate):

- Height: 111 mm (4.4 in.)
- Width: 18 mm (0.7 in.)
- Depth: 170 mm (6.7 in.)
- Weight: 222 g (0.5 lb)

Shipping dimensions and weight (approximate):

- Height: 51 mm (2.0 in.)
- Width: 143 mm (5.6 in.)
- Depth: 238 mm (9.4 in.)
- Weight: 327 g (0.7 lb)

Operating environment

The N2225 and N2226 SAS/SATA HBAs are supported in the following environment:

- Temperature (operational): 5 - 40 °C (41 - 104 °F) at 0 - 5,000 m (0 - 16,404 ft)
- Temperature (non-operational): -40 - 60 °C (-40 - 140 °F) at 10,700 m (35,105 ft)
- Relative humidity: 8% - 93% (non-condensing)
- Maximum altitude: 10,700 m (35,105 ft)

Agency approvals

The N2225 and N2226 SAS/SATA HBAs conform to the following regulations:

- UL
- cUL
- IEC60950
- EMC
- FCC
- CE
- VCCI
- BSMI
- C-tick
- KC

Related publications and links

For more information, see the following documents:

- US Announcement Letter
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS114-075
- N2225 support and downloads
  http://ibm.com/support/entry/portal/search_results?q=N2225
- N2226 support and downloads
  http://ibm.com/support/entry/portal/search_results?q=N2226
- System x Configuration and Options Guide
  http://ibm.com/systems/xbc/cog/
- ServerProven
  http://ibm.com/servers/eserver/serverproven/compat/us/

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